REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-11, 13-19, and 21-38 are currently pending. Claims 1, 3, 6, 10, 13, 14, 18, 21, 22, 24, 31, 33, and 37 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Claims 1-11, 13-19, and 21-38 were objected to as containing various informalities; Claims 14-16, 19, 21, 33-35, and 38 were rejected under 35 U.S.C. § 112, second paragraph; Claims 1, 6-9, 11, 13-17, 19, 21, 22, 27-30, 32-36, and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,931,780 to Giger et al. (hereinafter "the '780 patent") in view of U.S. Patent No. 6,661,873 to Jabri et al. (hereinafter "the '873 patent"); and Claims 2-5, 10, 13, 18, 21, 23-26, 31, and 37 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '780 and '873 patents, further in view of U.S. Patent No. 6,282,307 to Armato, III et al. (hereinafter "the '307 patent").

Initially, Applicants note that Claims 13 and 21 were listed as being rejected based on a combination of the '780 and '873 patents, but also were listed as being rejected based on a combination of the '780, '873, and '307 patents. However, it is unclear to Applicants which rejection was intended, since the Office Action fails to specifically address the dependent claims by claim number. For example, on pages 3 and 4, the Office Action appears to address Claims 1 and 14, but does not specifically address the limitations recited in Claims 6-9, 11, etc. Applicants respectfully request that in any future Office Action, the limitations recited in the dependent claims be addressed and that the Office Action refer specifically to individual claims.

Applicants respectfully submit that the objections to the claims are rendered moot by the present amendment to the claims. For example, the preamble of Claim 1 has been amended to be directed only to a method. Further, the antecedent basis questions noted by the outstanding Office Action in Claims 3, 18, 24, and 37 have been corrected. Accordingly, Applicants respectfully submit that the objections have been overcome.

Applicants respectfully submit that the rejections of Claims 14-16, 19, 21, 33-35, and 38 are rendered moot by the present amendment to Claims 14 and 33.

Amended Claim 1 is directed to a method, comprising: (1) obtaining a temporal subtraction image of an anatomical region of a patient from two images taken at respective times separated by a time interval that is long enough to allow for pathological change in the anatomical region; (2) extracting at least one feature from the subtraction image; (3) determining whether a region of interest in the subtraction image includes an abnormality associated with the pathological change, based on the extracted at least one feature; and (4) superimposing a computer-aided diagnostic symbol indicating a location of a region representing the pathologic change on at least one of the temporal subtraction image and the two images. The changes to Claim 1 are supported by the originally filed specification and do not add new matter.[1]

Regarding the rejection of Claim 1 under 35 U.S.C. § 103(a), the Office Action asserts that the '780 patent discloses everything in Claim 1 with the exception of "the use of multiple images at different times," and relies on the '873 patent to remedy that deficiency.[2]

Applicants respectfully submit that the rejection of Claim 1 (and all similar rejected dependent claims) is rendered moot by the present amendment to Claim 1.

---

[1] See, e.g., Figures 1a-1c, which illustrate a 2½ year gap between images.
[2] See page 3 of the outstanding Office Action.

The '780 patent is directed to a computerized method and system for radiographic analysis of bone structure. In particular, the '780 patent discloses a method that includes the steps of obtaining an image containing the bone, selecting a region of interest of the bone, determining at least one texture measure of the region of interest of the bone, and analyzing the bone using the at least one texture measure.

However, as admitted in the outstanding Office Action, the '780 patent does not disclose the use of multiple images at different times. In particular, Applicants respectfully submit that the '780 patent fails to disclose obtaining a temporal subtraction image of an anatomical region of a patient from two images taken at respective times separated by a time interval that is long enough to allow for pathological change in the anatomical region, as recited in amended Claim 1.

The '873 patent is directed to a method and system for decomposing soft tissue and bone images from low and high energy images acquired from an imaging system. In particular, the '873 patent discloses that artifacts may arise in the decomposed images due to anatomical movement between the two image acquisitions, for example, such as movement of a chest. In particular, the '873 patent discloses that the two images are acquired over a relatively short time period, "such as 100-200 ms." Further, the '873 patent discloses that, regarding the registration process shown in Figure 8, that "the process 400 is computationally efficient because the motion artifacts are constrained to only a few pixels due to the relatively short time interval between the low and high-energy image exposures."[3]

Thus, Applicants respectfully submit that the '873 patent fails to disclose obtaining a temporal subtraction image of an anatomical region of a patient from two images taken at respective times separated by a time interval that is long enough to allow for a pathological change in the anatomical region, as recited in Claim 1. On the contrary, the '873 patent

[3] '873 patent, column 8, lines 26-30. Emphasis added.

discloses that the low and high-energy images are taken as close together as possible such that the motion artifacts will be reduced due to movement of the patient.

Thus, no matter how the teachings of the '780 and '873 patents are combined, the combination does not teach or suggest the step of obtaining a temporal subtraction image of an anatomical region of a patient from two images taken at respective times separated by a time interval that is long enough to allow for pathological change in the anatomical region, as recited in amended Claim 1. In this regard, Applicants note that none of the cited references teach or suggest a time interval long enough to allow for pathological change, in obtaining the temporal subtraction image, and that one of ordinary skill in the art would not have been motivated to obtain the images recited in Claim 1 based on the combined teachings of the '780 and '873 patents.

Thus, Applicants respectfully submit that amended Claim 1 patentably defines over any proper combination of the '780 and '873 patents.

Amended Claim 22 is directed to an apparatus that includes means for obtaining a temporal subtraction image of an anatomical region of a patient from two images taken at respective times separated by a time interval that is long enough to allow for pathological change in the anatomical region. As discussed above, this functionality is not disclosed by any proper combination of the '780 and '873 patents. Accordingly, for the reasons stated above, Applicants respectfully submit that the rejection of Claim 22 (and all similar rejected dependent claims) is rendered moot by the present amendment to Claim 22.

Claim 14 is directed to a method, comprising: (1) obtaining a first dual-energy image, a first standard image, and one of a first bone image and a first soft tissue image from the first dual-energy image at a first point in time; (2) obtaining a second dual-energy image, a second standard image, and one of a second bone image and a second soft tissue image from the second dual-energy image at a second point in time; (3) using the first and second **standard**

images to obtain shift vectors to obtain image registration; (4) performing temporal subtraction, using the shift vectors, on one of the first and second bone images or one of the first and second soft tissue images to produce a temporally subtracted image; and (5) outputting the temporally subtracted image.

Regarding the rejection of Claim 14 under 35 U.S.C. § 103(a), the Office Action asserts that the '780 patent discloses everything in Claim 14 with the exception of the acquisition of shift vectors, and relies on the '873 patent to remedy that deficiency.

As discussed above, the '780 patent is directed to a computerized method and system for radiographic analysis of bone structure. However, as admitted in the outstanding Office Action, the '780 patent fails to disclose using first and second standard images to obtain shift vectors, and performing temporal subtraction using the shift vectors, as recited in Claim 14.

As discussed above, the '873 patent is directed to a method of improving image clarity of soft tissue and bone images decomposable from first and second energy images acquired by a digital radiographic imaging system at different times. As noted by the outstanding Office Action, Figures 7 and 8 relate to the dual energy image acquisition system as well as the image registration process shown in step 316 and in Figure 8. However, as described with regard to Figure 8 "the process 400 registers the low and high-energy images 302 and 304 by obtaining shift vectors of one image with respect to the other."[4] Further, the '873 patent discloses that a warping transformation is then performed on the low-energy image 302 to align anatomy with respect to the high-energy image 304 prior to dual energy decomposition into soft tissue and bone images. Thus, the '873 patent discloses a registration process between the low and high-energy images prior to decomposition into soft tissue and bone images.

[4] '873 patent, column 8, lines 20-22.

However, Applicants respectfully submit that the '873 patent fails to disclose using the first and second standard images to obtain shift vectors to obtain image registration, and perform a temporal subtraction using the shift vectors, on one of the first and second bone images or one of the first and second soft tissue images to produce a temporally subtracted image, as required by Claim 14. In this regard, Applicants note that Claim 14 recites a first dual energy image, a standard image and one of a first bone image and a first soft tissue image, as well as a second dual energy image, a second standard image, and one of a second bone image and a second soft tissue image obtained from the second dual energy image at a second time point. Further, Applicants note that Claim 14 requires the comparison of the first and second **standard** images to obtain shift vectors and then the application of those shift vectors to either the first and second **bone** images or the first and second **soft tissue** images to produce a subtracted image. On the contrary, the '873 patent merely discloses registration between a low and high-energy image **prior** to producing the soft tissue or bone images. Claim 14 requires obtaining shift vectors between first and second standard images, not high and low-energy images. Moreover, the '873 patent is silent regarding obtaining shift vectors from one set of images and applying the shift vectors to another set of images, as required by Claim 14. Rather, the '873 patent discloses comparing two images for the purpose of registration and applying the shift vectors obtained from that comparison to one of the two images.

For the reasons stated above, Applicants respectfully submit that a *prima facie* case of obviousness has not been established and that the rejection of Claim 14 (and all similarly rejected dependent claims) should be withdrawn.

Independent Claim 33 is directed to an apparatus that includes means for using the first and second standard images to obtain shift vectors, and means for performing temporal subtraction, using the shift vectors. As discussed above, these functional limitations are not

disclosed by any proper combination of the '780 and '873 patents. Accordingly, for the reasons stated above, Applicants respectfully submit that a *prima facie* case of obviousness has not been established and that the rejection of Claim 33 (and all similarly rejected dependent claims) should be withdrawn.

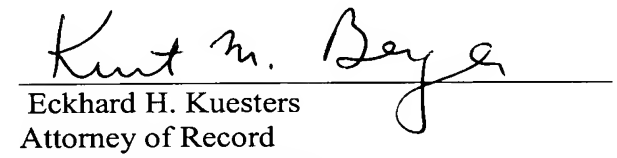
Regarding the rejection of dependent Claims 2-5, 10, 13, 18, 21, 23-26, 31, and 37 under 35 U.S.C. § 103(a), Applicants respectfully submit that the '307 patent fails to remedy the deficiencies of the '780 and '873 patents, as discussed above. Accordingly, Applicants respectfully submit that the rejections of Claims 2-5, 10, 23-26, and 31 are rendered moot by the present amendment to Claims 1 and 22. Further, Applicants respectfully submit that a *prima facie* case of obviousness has not been established and the rejections of Claims 18 and 37 should be withdrawn.

Thus, it is respectfully submitted that independent Claims 1, 14, 22, and 33 (and all associated dependent claims) patentably define over any proper combination of the '780, '873, and '307 patents.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Eckhard H. Kuesters
Attorney of Record
Registration No. 28,870

Kurt M. Berger, Ph.D.
Registration No. 51,461

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)